of their audience, various diagrams illustrative of their subject. Is it possible then that the gentleman who undertook to furnish original designs for the various classes in the school, who agreed to teach the whole body of the students in the varied round of instruction promised in the school; and who took exclusively upon himself the task of teaching the *upper* class of the school, should feel himself incompetent to the use of so common and generally received a vehicle of instruction as the black board? And yet upon what other grounds is it possible to account for such a message as that sent by the director to Mr. Herbert, or for the virulence with which he has pursued that gentleman, until at last he has procured the dismissal of one who had done, and was doing, more for the success of the school, and the benefit of the students, than any one else at any time connected with it. The truth is, the council had hoped to have veiled from the public their want of foresight, in appointing to the office of director a gentleman practically ignorant, and to have imposed the belief that the school was rapidly progressing to perfection under their management. The students have dared to rend the mask from before them. They have said to the public what the council had said to each other over their own tables long before; and we are punished accordingly. Not for uttering falsehoods, but for daring to speak the truth.

I trust, Sir, that you will excuse my intruding so long on your valuable time, and I remain, yours, &c., R. BURCHATT.

August 25th, 1845.

SUSPENSION BRIDGES.

SIR,—I do not think Mr. Hosking, in his "Treatise on Bridge Building," investigates the principle illustrated by the diagrams in your 128th number. I cannot contradict "B. B." on this point, but can say I have never seen it, and should like very much to have it pointed out to me. I did not make a choice of the works at Derby and Ashton, but inserted them in my letter because they were the first instances that occurred to me at the time, probably for the reason that they had lately happened, and were therefore fresh in my memory. I know nothing of the particulars in either case further than was given by the newspapers at the time; but, if my recollection serves me, the centres in both bridges were being struck, and therefore they were completed. Neither did I require these examples to fill up a vacuum in an argument which was of minor importance, and which I did not enter upon in my first letter until after stating I had replied to "all that concerns me;" for I could adduce a score of bridges that have fallen, and an immense number in a very dilapidated state, if it were not invidious to the engineers to mention them.

"B. B." mistakes my position if he supposes it to be suspension *versus* compression bridges. It is the *principle upon which both suspension and compression bridges are generally built* to which I object, and which I say is incorrect. To set it clearly before you, let it be allowed, that of two principles (which require for their investigation data differing from each other), when carried out in practice, and compared together, that which is superior in power, and admits of unlimited extension, may be termed correct, whilst that which is inferior in power, and continually approaching towards a maximum, incorrect. This being premised, here are a few experiments with suspension models, constructed on the catenary, and on my plan.

"In Bristol, Jan. 6, 1838, two models of equal materials and dimensions were tried. The parallel chain model bore 1·565 lbs.; the taper chain model bore 3·681 lbs. Again, in Bristol, Jan. 10, 1838, the parallel chains bore 1·456 lbs.; the taper chains bore 3·696 lbs. Another trial before the same party, the same day, was made with models constructed by Mr. Cross, of Bristol, unknown to Mr. Dredge, in order to prove that all was fair in the former trials; and the result was, the parallel chains bore 2·632 lbs., and the taper chains bore 6·849 lbs. Each model broke on adding more weight, and the chains throughout on the taper principle was reduced one size by the experiments."*

* Lord Western to Lord Melbourne.

These experiments are proved by practice and verified by mathematical investigation, which does not shew a maximum in extent of span. Hence, that principle which demonstrates the tapering chains may with propriety be termed correct; whilst that which compels the catenary, incorrect: and now to apply this reasoning to compression bridges. The only condition involved in our present inquiry depends upon the line of resistance which is traced from the resultants of the pressures applied to the arch of the bridge. Now, since these pressures are similar, and similarly applied both in suspension and compression bridges, their resultants are similar; and because it is the relative magnitude and position of these pressures which constitute the principle, we argue that since they are similar in each, the principle is the same in both. But the investigation turns on this point, that in the former the direction of the bars in the curve is determined by the direction of the resultants of pressures, whilst in the latter these resultants trace out some line within the boundary of the voussoirs, and the stability of the structure depends upon this line not intersecting the extrados or intrados of the arch. Now, if the fundamental principle is the same in both, and has been proved in one to be wrong, it follows it must be wrong in the other also.

By this time "B. B." will see that the failure of the suspension bridges which he brings forward are proofs in my favour, because they tend to shew that the principle upon which they are built is erroneous,—the very position I take. I have merely to remark in reference to the extract from Professor Hosking's work, that it is the opinion of an eminent man, to which I offer no objection, when the span is small, the command of capital large, provided the head room beneath the arch, or a hill over it be of no consequence; for in such cases any error of principle may be counteracted by immense masses of material, which the public have been used to see, and therefore think substantial, but because the error increases in a greater ratio than the span, when we come to extensive bridges there is this objection, viz. that the use of stone is impossible, in large spans it is very difficult of application, and in very extensive ones impracticable.

"B. B.," Still dwelling upon suspension bridges, after alluding to many circumstances which are supposed to alter the internal structure of iron, goes on to say: "in proof of which see the accounts of the numerous accidents that have occurred on the various lines of railway from the fracture of the axles of railway carriages," &c. This is no proof at all, Sir, for in the axle of a railway carriage the forces are applied at right-angles to the direction of the fibres, but in the bars of a suspension bridge in the direction of them, the mechanical action of the fibres of the two is very different, the mathematical principles distinct, and therefore the comparison is erroneous.

With regard to the Yarmouth bridge, the immediate cause of failure is easily accounted for by the fact that the section of iron in the chains was not sufficient to resist the effects of a loaded platform, for at the time of the accident there were several tons of tension in the chains more than the engineer should have allowed, and this, coupled with the inferior quality of the iron, accounts for the failure. It may be very true that twice the number had been upon the bridge, but then the weight was equally sustained by both chains; and besides, perhaps this weight might have permanently injured the iron by straining it beyond its limits of elasticity, so that when the lesser weight came on one chain it broke down. A question may be asked of me, would not your plan if similarly situated be attended with a similar result? Certainly not; for in the first place, if any part of the chain had an under strain upon it, the rest would be immediately active to resist it; and secondly, even supposing the chains to fracture similar to the Yarmouth, only one-eighth of the bridge would have sunk, and this not sufficient to have endangered life, because the remaining seven-eighths would have stood as firm as ever, and would have supported it.

I have again to remark that all the objections urged against suspension bridges generally are arguments in my favour. And in reference to the oscillation which "B. B." here speaks of, I beg to refer him to my letter published in your 124th number.

I am, Sir, &c.,

Bath, August 18th. JAMES DREDGE.

P.S. "M. Navier speaks of a chain stretched across between two rocks that command the town of Mourtiers, in the department de Basses Alpes. It is 656 feet long, and made of rods about 2 feet 1¼ inch long, and ¾ inch diameter, hooked one to the other without any intermediate links. The date of its erection is not certain, but it is supposed to belong to the thirteenth century. It does not, however, appear to have been ever intended for a bridge, but is thought by some to have been an offering to the Virgin to obtain protection against being overwhelmed by the rocks that overhang it. By others it is attributed to a knight of Rhodes, who is supposed to have erected it in consequence of a vow made during his captivity in the holy land. The iron is said not to be injured by rust."—*Drewry, page* 9.

*** We learn from the newspapers that a suspension bridge near Calcutta has just now fallen in. It was known as the Ballee Khall bridge, and was the largest of the kind ever constructed in India. It gave way in the middle just as it was completed, and fell into the creek over which it was erected. The accident is attributed to an error in judgment of the contractor, while making some necessary alterations, and does not in any degree effect the principle on which the bridge was built.

POWER OF CORONERS TO INQUIRE INTO THE CAUSE OF FIRES.

QUEBEC, New York, London, have been recently the scenes of fresh conflagrations,—lives have been lost and property destroyed to an enormous extent. The attention of Europe is awakened to the importance of an inquiry into the means of averting this dreadful catastrophe, and it is to be hoped that some steps with that end in view may speedily be taken.

Last week a jury of the inhabitants of the ward of Cripplegate-within were empanelled before Mr. W. Payne, the city coroner, at the School-house, Philip-lane, Aldermanbury, to inquire into the cause of the late fire on the premises of Messrs. Bradbury and Co. Manchester-warehousemen, of Aldermanbury.

The investigation, from its novelty, excited considerable interest, several of the common council of the ward, together with the civic authorities, being present.

The coroner, on taking his seat, said he would take the liberty of stating, as the present was rather a novel proceeding, why he had called them together. Latterly the number of fires in London had considerably increased, and when they took into consideration that nothing was so fearful as fire, they would be of opinion with him that when they had the power to inquire into the causes of such fires, nothing could be more important to the public at large than that the cause should be closely investigated. The ancient authorities shewed that in olden times it was the practice of the coroner to inquire into all burnings within his district, and that power still belonging to the coroner, although fallen into desuetude, he thought that they would be of opinion with him that it was most important that it should again be brought into force. In "Horne's Mirror of Justice" the duties of the coroner were clearly laid down, and among those duties the coroner was to inquire of all burnings, whether they were caused by felony or mischance. If they were of opinion that they had been set on fire with a felonious intent, then it was their duty to inquire and ascertain who the party was who was guilty of that felony. It was clear, therefore, in the olden time, that part of the coroner's duty was to inquire into all burnings; and he need not say how necessary it was to revive it at the present time. No one had the power to inquire into the causes of a fire—not even a magistrate, unless a party was in custody charged with causing it. The persons living in the neighbourhood of a fire were always most anxious to know how it occurred, and he thought the public would think that he had done no more than his duty in causing a jury to be summoned to inquire into the circumstances of the late fire, who also might, by any suggestion thrown out, prevent, in a great

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